

A STUDY OF SWEET POTATOES -  
THEIR NUTRITIVE VALUE, UTILIZATION,  
AND STANDARDIZED METHODS OF COOKERY

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Submitted as an Honors Paper  
in the  
Department of Home Economics

THE WOMAN'S COLLEGE OF THE UNIVERSITY OF NORTH CAROLINA

GREENSBORO, NORTH CAROLINA

1948

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## CHAPTER I

### Introduction

Sweet potatoes are one of the most important foods grown and consumed in the South. They have long been a staple food in the Southern diet, particularly among rural families. Dietary studies made among rural families in Georgia<sup>1</sup> show a consumption of approximately two and one half times as many sweet potatoes as Irish potatoes.

While small amounts of canned, dehydrated, and frozen sweet potatoes are used during the summer months, the period of highest consumption is from November through February, when fresh potatoes are abundant.

Since fresh potatoes are available for a limited period of time, and since a great many are consumed in that short time, it is desirable that methods of preparation be varied, in order to prevent monotony in the diet. Variety is possible, since a great many unusual and interesting sweet potato recipes exist. Most of these, however, are not well-known and are not standardized. They are characteristic of certain sections or communities and are unknown to others, since they do not appear in recipe books. Attempts have been made by the

<sup>1</sup> C. Newton and G. Lowry, "The Vitamin C Content of the Porto Rico Sweet Potato", Journal of Home Economics, XXIX, 1937, 114.

United States Department of Agriculture<sup>2</sup>, the North Carolina Agricultural Extension Service<sup>3</sup>, and the War Food Administration<sup>4</sup> to collect, standardize, and compile some of these sweet potato recipes, but there remain many unusual recipes which have not been published.

Because of the extensive use of sweet potatoes, it is important to know their nutritive value as they are served. A great many studies have been made on the nutritive value of both raw and cooked sweet potatoes. An investigation of these studies was the first step in the present study.

The purpose of this study has been:

(a) To study the literature on the nutritive value of sweet potatoes,

(b) To become acquainted with the various methods of preparing sweet potatoes for human consumption,

(c) To secure and compile recipes for sweet potato cookery, with emphasis on unpublished recipes, and

<sup>2</sup> "Sweet Potato Recipes", U. S. Department of Agriculture Bulletin AIS-58, October 1946.

<sup>3</sup> "Sweet Potatoes - How to Use Them", N. C. Agricultural Extension Service Miscellaneous Pamphlet 79, October, 1944.

<sup>4</sup> "Sweet Potato Recipes", War Food Administration, Office of Distribution Circular.

(d) To test sweet potato pie recipes used in North Carolina in order to develop a technique which will insure standard products. These standardized recipes may then be used in preparing products for chemical studies of the nutritive value of various types of sweet potato pie.

## CHAPTER II

### Review of Literature on Nutritive Value

Sweet potatoes are generally considered to be good sources of Vitamin A. Vitamin A, in the form of carotene, pro-Vitamin A, is indicated by the characteristic yellow or orange color. The amount of carotene varies with the intensity of the yellow color in the flesh of the sweet potato.<sup>5</sup>

For fresh raw sweet potatoes, Vitamin A values were found by Smith and coworkers<sup>6</sup>, using chemical analyses, to range from 0.80 milligrams per 100 grams to 6.22 mg. per 100 gm., with an average value of 1.31 mg. per 100 gm. (2,133 International Units) for Nancy Hall variety and an average value of 4.97 mg. per 100 gm. (8,233 I.U.) for the Porto Rico variety. MacLeod, Talbert, and Toole<sup>7</sup> show an average value of 1.80 mg. per 100 gm. (3,000 I.U.) for Nancy Hall sweet potatoes. Lease and Mitchell<sup>8</sup>, using

<sup>5</sup>M. Speirs, et al, "The Effects of Fertilizer Treatments, Curing, Storage, and Cooking on the Carotene and Ascorbic Acid Content of Sweet Potatoes", Southern Cooperative Series Bulletin 3, December 1945.

<sup>6</sup>M. Smith, et al, "Ascorbic Acid and Carotene Content of Sweet Potatoes", Arizona Agricultural Experiment Station Report 71, April 1945.

<sup>7</sup>MacLeod, et al, "Vitamin A and B Contents of Nancy Hall Sweet Potato", Journal of Home Economics XXIV, 1932, 928.

<sup>8</sup>E. Lease and J. Mitchell, "Biochemical and Nutritional Studies of Dehydrated Sweet Potato", S. C. Agricultural Experiment Station Bulletin 329, June 1940.

chemical analyses, give an average value of 4.0 mg. per 100 gm. for raw Porto Rico sweet potatoes.

In attempts to determine the effect of storage upon the carotene or Vitamin A content of sweet potatoes, few significant changes have been found to occur during the storage period. Smith and coworkers<sup>9</sup> found slight increases in carotene value during storage, but they are not believed to be significant. Speirs, Peterson, and coworkers<sup>10</sup>, using chemical analyses, did not find significant changes in carotene value during storage. Their results also showed no significant changes in carotene value due to fertilizer treatments. Swanson and coworkers<sup>11</sup>, using bioassays, found that fertilizer treatments did not significantly affect carotene values.

Speirs, Peterson, and coworkers<sup>12</sup>, in determining the effect of cooking processes on the carotene value of sweet potatoes, found a loss of 9.9% during boiling and 23.9% during baking of the sweet potatoes.

<sup>9</sup> M. Smith, et al, op. cit.

<sup>10</sup> M. Speirs, et al, op. cit.

<sup>11</sup> P. Swanson, et al, "The Effect of Fertilizing Treatment on Vitamin A Content of Sweet Potatoes", Food Research V, 1940, 431.

<sup>12</sup> M. Speirs, et al, op. cit.

Ascorbic acid values found by Scoular and Eakle<sup>13</sup>, using the microbiological assay method, range from 11.0 mg. per 100 gm. for Unit I Porto Rico potatoes to 27.5 mg. per 100 gm. for Porto Rico (old), with an average value of 15.9 mg. per 100 gm. Cooking tests on the Nancy Hall variety showed an average loss of 35% in baking and a gain of 345% in boiling. The workers believe this unusual gain may be due to error in calculation of raw value. Results shown by Hollinger<sup>14</sup>, using chemical analyses, give ascorbic acid values ranging from 23.5 mg. per 100 gm. for Triumph variety to 33.3 mg. per 100 gm. for Nancy Hall variety. Losses due to storage amounted to 23-40% of the original value. Cooking losses were 17-31% of the original value.

Newton and Lowry<sup>15</sup>, using the bioassay method, found an average value of 0.2 Sherman units (10-15 mg. per 100 gm.) of ascorbic acid for Porto Rico sweet potatoes, raw or boiled. Baked potatoes were found to be two-thirds as rich as raw potatoes in ascorbic acid.

<sup>13</sup> F. Scoular and D. Eakle, "Loss of Ascorbic Acid During Cooking of Stored Sweet Potatoes", Food Research VIII, 1943, 156.

<sup>14</sup> M. Hollinger, "Ascorbic Acid Value of the Sweet Potato as Affected by Variety, Storage, and Cooking", Food Research IX, 1944, 76.

<sup>15</sup> C. Newton and G. Lowry, "The Vitamin C Content of the Porto Rico Sweet Potato", Journal of Home Economics XXIX, 1937, 114.

Speirs, Peterson and coworkers<sup>16</sup>, using chemical analyses, show an average ascorbic acid value in fresh raw Porto Rico potatoes of 25.5 mg. per 100 gm. Storage caused a loss of 17% of the ascorbic acid value. After boiling there was an average ascorbic acid value of 24.43 mg. per 100 gm. Baked potatoes gave a value of 23.42 mg. per 100 gm. Fertilizer treatments had insignificant effect on the ascorbic acid value of the potatoes.

Studies made by Pearson and Luecke<sup>17</sup>, using microbiological assay method, show thiamin values ranging from 1.00 micrograms per gram to 1.70 mcg. per gm., with an average value of 1.39 mcg. per gm. in raw potatoes. Riboflavin values range from 0.35 mcg. per gm. to 0.60 mcg. per gm. For nicotinic acid, the range values given are 4.00 mcg. per gm. to 6.80 mcg. per gm., with an average value of 5.56 mcg. per gm. Baked potatoes retained an average value of 1.04 mcg. thiamin per gm., 0.41 mcg. riboflavin per gm., and 4.72 mcg. nicotinic acid per gm. Boiled potatoes showed values of 1.28 mcg. thiamin per gm., 0.47 mcg. riboflavin per gm., and 5.59 mcg. nicotinic acid per gm.

<sup>16</sup> M. Speirs, et al, op. cit.

<sup>17</sup> P. Pearson and R. Luecke, "The B Vitamin Content of Raw and Cooked Sweet Potatoes", Food Research X, July-August 1945, 325.

Cheldelin and coworkers<sup>18</sup>, using the microbiological assay method, found an average riboflavin value of 0.41 mcg. per gm. for raw potatoes, and 0.40 mcg. per gm. for cooked potatoes. Nicotinic acid average values were 4.54 mcg. per gm. for raw potatoes and 5.53 mcg. per gm. for cooked potatoes.

Russell and coworkers<sup>19</sup>, using the microbiological assay, show nicotinic acid values ranging from 5.27 mcg. per gm. to 7.90 mcg. per gm. for raw potatoes, with an average value of 6.27 mcg. per gm. Range values for cooked potatoes were 4.23 mcg. per gm. to 7.36 mcg. per gm., with an average value of 5.10 mcg. per gm.

Tepley and coworkers<sup>20</sup>, using the microbiological method of analysis, found an average nicotinic acid value in fresh raw sweet potatoes of 4.53 mcg. per gm.

Lane, Johnson, and Williams<sup>21</sup>, using bioassay, found an average thiamin value in raw potatoes of 1.09 mcg.

<sup>18</sup> V. Cheldelin, et al, "Losses of B Vitamins Due to Cooking of Foods", Journal of Nutrition XXVI, 1943, 477.

<sup>19</sup> W. Russel, et al, "Nicotinic Acid Content of Common Fruits and Vegetables as Prepared for Human Consumption", Journal of Nutrition XXV, 1943, 275.

<sup>20</sup> L. J. Tepley, et al, "The Distribution of Nicotinic Acid in Foods", Journal of Nutrition XXIII, 1942, 417.

<sup>21</sup> R. Lane, et al, "Studies of the Average American Diet, I - Thiamin Content", Journal of Nutrition XXIII, 1942, 613.

per gm., and 0.41 mcg. per gm. in baked potatoes.

For the purpose of comparison, range values and average values found by different workers are given in Tables I, II, and III. In some cases, range values, average, or the number of samples were not given in the report, and so are not included in the table. In several instances, retention percentages rather than values were given. Values have been calculated from these percentages on the basis of the average fresh value.

In conclusion, studies indicate that sweet potatoes are a good source of Vitamin A and a fair source of ascorbic acid. The limited scope of studies that have been made on Vitamin B content make it impossible to draw general conclusions on the significance of Vitamin B in sweet potatoes.

Vitamin A, in the form of carotene, is affected very little by fertilizer, storage, or cooking. Ascorbic acid losses are high during storage and during baking, while ascorbic acid values increase during boiling. Vitamin B values are reduced during cooking processes.

TABLE I  
 ASCORBIC ACID VALUE OF SWEET POTATOES

Workers	Year	Material - Variety	Treatment	Method of Analysis	Number Samples	Ascorbic Acid-mg per 100 gm		
						Minimum	Maximum	Average
Scoular, Eakle	1942	8 Varieties		Micro-biological	1			
		All varieties	Raw peeled		1	11.0	27.5	15.9
		Nancy Hall	Boiled		1			65.7
		Nancy Hall	Baked		1			3.0
		Nancy Hall	Candied		1			22.1
Speirs, et al	1944	Porto Rico	Raw	Chemical	27			25.5
			Stored		27			21.2
			Boiled		27			24.4
			Baked		27			23.4





TABLE II.  
VITAMIN A VALUE OF SWEET POTATOES

Workers	Year	Material - Variety	Treatment	Method of Analysis	Number Samples	Vitamin A - mg per 100 gm			I.U. av.
						Min.	Max.	Av.	
MacLeod	1931	Nancy Hall	Raw	Chemical	-			1.80	3,000
Lease, Mitchell	1940	Porto Rico	Raw	Chemical	-			4.0	6,664
Swanson et al	1940	Prolific	Fertilizer used	Biological	7-15 rats			1.38	2,300
Speirs et al	1944	Porto Rico	Raw	Chemical	102			4.64	7,730
			Boiled		100			4.39	7,313
			Baked		100			4.33	7,030

TABLE II (CONTINUED)  
 VITAMIN A VALUE OF SWEET POTATOES

Workers	Year	Material - Variety	Treatment	Method of Analysis	Number Samples	Vitamin A-mg per 100 gm			I.U. av.
						Min.	Max.	Av.	
Smith et al	1945	Nancy Hall	Raw, fresh	Chemical	6-12	0.80	1.90	1.31	2,183
		Porto Rico	same			3.09	6.22	4.97	8,283
		Nancy Hall	Stored 4 months			0.40	3.29	2.17	3,617
		Porto Rico	same			4.17	6.35	5.79	9,650

TABLE III

VITAMIN B VALUE OF SWEET POTATOES

Workers	Year	Material - Variety	Treatment	Method of Analysis	Number Samples	Micrograms per gram				
						Min.	Max.	Average		
Vitamin B <sub>1</sub> - Thiamin										
Lane, et al	1941	Variety not known	Raw	Biological				1.09		
			Baked						0.41	
Pearson, Luecke	1944	4 varieties	Raw	Micro- biological	40	1.00	1.70	1.39		
			Baked					20	-	1.04
			Boiled					14	-	1.28

TABLE III (CONTINUED)

VITAMIN B VALUE OF SWEET POTATOES

Workers	Year	Material - Variety	Treatment	Method of Analysis	Number Samples	Micrograms per gram		
						Min.	Max.	Av.
Nicotinic Acid or Niacin								
Tepley et al	1942	Variety not known	Unknown	Micro- biological	-			4.53
Russell et al	1942	Variety not known	Raw	Micro- biological	-	5.27	7.90	6.27
			Boiled			4.73	7.36	5.10
Pearson, Luecke	1944	4 Varieties	Raw	Micro- biological	40	4.00	6.80	5.56
			Baked		20	-	-	4.72
			Boiled		14	-	-	5.59

TABLE III (CONTINUED)  
 VITAMIN B VALUE OF SWEET POTATOES

Workers	Year	Material - Variety	Treatment	Method of Analysis	Number Samples	Micrograms per gram		
						Min.	Max.	Average
Niacin (continued)								
Chelde- lin, et al	1942	Variety unknown	Raw	Micro- biological	-	-	-	4.54
			Baked		-	-	-	5.58

TABLE III (CONTINUED)

VITAMIN B VALUE OF SWEET POTATOES

Workers	Year	Material - Variety	Treatment	Method of Analysis	Number Samples	Micrograms per gram		
						Min.	Max.	Average
Vitamin B <sub>2</sub> - Riboflavin								
Chel- lin, et al	1942	Variety unknown	Raw	Micro- biological	-			0.41
			Baked		-			0.40
Pearson, Luecke	1944	4 Varieties	Raw	Micro- biological	40	0.60	0.35	0.46
			Baked		20	-	-	0.41
			Boiled		14	-	-	0.47

## CHAPTER III

### Selection, Storage, Preparation and Use of Sweet Potatoes

Since sweet potatoes have a mild flavor, they can be used in many ways and in numerous food combinations. They may be used as a basic food, with variations in flavor, or they may be used in small amounts to give variety to other foods. Some of the interesting methods of preparation are discussed here; recipes may be found, under the same topics, in the Appendix of this study.

#### Sweet Potatoes Served as a Vegetable

The most common use of sweet potatoes in the meal is as a vegetable dish. For this purpose, they are usually baked, mashed, boiled, candied, or glazed. For more unusual sweet potato vegetable dishes, the mashed potatoes may be shaped into balls and fried. Sweet potato sticks, chips, or fried sweet potatoes are also used as vegetable dishes. Sweet potato souffle may be used as a vegetable or as a main dish for a luncheon.

#### Sweet Potatoes in Desserts

For use as a dessert, sweet potato pie is the most common method of preparation. There are a great many variations of this method of preparation, some of which are similar in nature to sweet potato pudding. Other sweet potato desserts are cakes and cookies, in which

sweet potatoes are substituted for a part of the flour. Ice cream may be made with sweet potatoes used as a flavoring.

#### Sweet Potato Breads

In breadstuffs, sweet potatoes are usually substituted for a part of the flour. Products which may be made with sweet potatoes are biscuits, muffins, rolls, nut loaf, and waffles.

#### Combination Dishes With Sweet Potatoes

As a mild-flavored food, sweet potatoes are used often in combination with highly flavored or rich foods. They are used with meats, particularly pork. They may be used with fruits such as apples, oranges, pineapple, and raisins, or with any kind of nuts. Very rich dishes may be prepared with a sweet potato base, using nuts, fruits, and whipped cream. Many flavorings and spices may be added to sweet potatoes to give variety.

#### Selection, Storage, Preparation for Cooking

In fresh sweet potato cookery, it is important that good potatoes be selected and that proper conditions be maintained prior to cookery. There are two general types of sweet potatoes. The type commonly called sweet potatoes are dry, mealy, and light yellow in color. The yam is deeper in color, moist, and sugary. Selection should be

made according to the qualities desired in the final product.

Sweet potatoes may be stored for several months at a temperature of 55°-60° F<sup>22</sup>. A dry storage place is desirable, since moisture favors rotting of the potatoes.

Peeled raw sweet potatoes turn dark brown at the surface, especially at the stem end, due to oxidation processes<sup>23</sup>. It is therefore desirable to peel potatoes immediately before use or to cook them in the skins. Cooked potatoes, upon exposure to air, may turn blue-green. This occurs particularly when hot sweet potatoes are exposed to air.<sup>24</sup> Two tenths per cent citric acid or lemon juice added to the cooked potato restores the normal color. A pH value of 5 or lower is required to prevent discoloration or to restore the natural color.<sup>25</sup> This acidity gives a tartness of flavor that is desirable in sweet potato cookery.

#### Commercial Sweet Potato Products

Recent research has shown that many sweet potato products are possible and desirable. Dehydrated products

<sup>22</sup>"Sweet Potato Recipes", U. S. Department of Agriculture Bulletin AIS-58, October 1946.

<sup>23</sup> J. G. Woodroof and Ida S. Atkinson, "Preserving Sweet Potatoes By Freezing", Georgia Exp. Station Bulletin 232, March 1944.

<sup>24</sup> Ibid., p. 9.

<sup>25</sup> Ibid.

called Alayam Products have been developed at the Alabama Agricultural Experiment Station. They may be used in cereals, in baking, candy making, and various forms of cookery.<sup>26</sup> These products are still in the experimental stage and are not available to the retail or wholesale market. In the future, they may become significant and may make the sweet potato industry increasingly important in the South.

Dehydrated sweet potatoes and canned sweet potatoes may be used in a similar manner to fresh potatoes, although products made from them may not be quite as desirable. Freezing seems to be the most desirable method of preserving sweet potatoes<sup>27</sup>, but this method also is in the experimental stage.

Numerous studies have been made on the desirability of manufacturing sweet potato chips, but no satisfactory product has yet been developed.<sup>28</sup>

With the continuation of research, commercial sweet potato products may take their place with fresh sweet

<sup>26</sup> L. M. Ware, "Nature of Alayam Products", Alabama Agricultural Experimental Station Circular.

<sup>27</sup> J. G. Woodroof, op. cit.

<sup>28</sup> Personal communication with Mr. W. W. Chichester, Marietta, Georgia, October 1947.

potatoes, thus increasing the use of sweet potatoes as food.

## CHAPTER IV

### Experimental Study - Sweet Potato Pies

#### Introduction

Sweet potato pies are popular as a method of sweet potato cookery, particularly in North Carolina. There are several types of sweet potato pies, with numerous recipes for each. The best known type is probably the sweet potato custard pie, of which there are many variations. Less common types are sweet potato chiffon pie, grated raw sweet potato pie, sliced sweet potato pie, and sweet potato cobbler.

In an effort to become familiar with these different types of sweet potato pies and to standardize recipes for them, this series of experiments has been conducted. Various recipes have been tested and standardized, using different ingredients, utensils, and methods of preparation.

#### Materials

Sweet potatoes bought on the retail market in Greensboro have been used for all experiments. Unless otherwise stated in the experiment, the following ingredients have been used, as indicated by the individual recipes:

Margarine in fillings, Crisco in pastry, cold storage eggs, granulated sugar, homogenized milk, corn syrup,

ground spices, and all-purpose flour.

Utensils used, unless otherwise stated, have been as follows:

Nest of Pyrex mixing bowls, coarse sieve, Mary Ann measuring cups, Mary Ann measuring spoons, wire pastry blender, rotary egg beater, pastry cloth, wooden rolling pin, and six inch pie pans.

Unless otherwise stated, an electric stove has been used for experiments.

#### Procedure

Recipes have been varied throughout the experiments, and are given in the discussion of the individual experiments. The procedure for making the filling has been varied with individual recipes.

The procedure for making pastry has been the same for most of the experiments. Unless otherwise stated in the experiment, the procedure has been as follows:

Flour was sifted, measured, and sifted again with salt. Fat, at refrigerator temperature, was cut in with a pastry blender until pieces were the size of rice kernels. Ice water was added gradually, as flour was tossed lightly with a fork. Pastry was gathered into a ball. An amount sufficient for the size of the pan was placed on a lightly floured pastry cloth and rolled

to 1/8 inch thickness. The pastry was placed in an ungreased pie pan. There was no rerolling of any portion of pastry.

When potatoes were boiled whole, as in most of the experiments, boiling time was 25 to 35 minutes, depending upon the size of the potatoes.

Baking procedure, time, and temperatures were varied with individual recipes.

#### Scoring

For scoring the baked products, three judges were selected from the Home Economics faculty. These three judges scored the products throughout the experiments. A sample of the score sheet used and an explanation of the scoring system may be seen in Table IV. Best products were scored with a 3, least desirable products scored with a 1, and a score of 2 given for moderately desirable products.

Products for scoring were numbered, and the judges were not given any information regarding the variations in procedure of preparation or ingredients. This was done in an attempt to prevent errors due to preconceived prejudices. All pies were scored while fresh, with approximately two hours allowed for cooling before sampling.

TABLE IV  
SCORING SYSTEM

Score Sheet for Pastry				
	1	2	3	Score
1. Color	Dark brown, pale, uneven		Delicate brown	1.
2. Moisture	Soggy		Dry	2.
3. Tenderness	Tough, Hard		Crisp, Tender	3.
4. Texture	Compact, crumbly		Light, flaky	4.
5. Flavor	Raw, burned, flat, unpleasant		Pleasing	5.
6. Appearance	Smooth, large blisters		Slightly rough	6.

1 = Poor quality  
2 = Good quality  
3 = Excellent quality

Score Sheet for Custard Pies and Grated Pies				
	1	2	3	Score
1. Flavor	Flat, too spicy, acidic, unpleasant		Pleasing	1.
2. Texture	Coarse, Dry		Firm, moist, fine	2.
3. Surface	Cracked		Smooth	3.
4. Color	Dull		Bright, Clear	4.

1 = Poor quality  
2 = Good quality  
3 = Excellent quality

TABLE IV (CONTINUED)

## SCORING SYSTEM

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Score Sheet for Sliced Pies				
	1	2	3	Score
1. Moisture	Dry, too much liquid		Moist	1.
2. Color	Dull, uneven		Clear, even	2.
3. Flavor	Flat, acidic, too sweet		Pleasing	3.
4. Sweetness	Too sour, too sweet		Pleasing	4.

---

1 = Poor quality  
 2 = Good quality  
 3 = Excellent quality

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Score Sheet for Chiffon Pies				
	1	2	3	Score
1. Texture	Coarse		Smooth	1.
2. Color	Dull, uneven		Bright, Clear, Even	2.
3. Flavor	Flat, unpleasant		Pleasing	3.
4. Consistency	Tough, stiff		Firm, tender	4.

---

1 = Poor quality  
 2 = Good quality  
 3 = Excellent

---

### Experiments and Results

Individual experiments were performed on each variable of ingredients, utensils, and procedure. Only one variable was allowed in an experiment, all other factors being kept constant. The purpose of this procedure was to discover the effect of the one variable, so that the recipe might be adjusted to give a standard product with the use of that variation, or so that that factor, if it gave an improved product, might be incorporated in the recipe.

Results, in the form of average scores, are given in Tables 6-10. These results, along with the individual recipes, materials, and procedures, are discussed in the following outline of experiments.

Acquisition of Technique - Several preliminary experiments were carried out in an effort to become familiar with experimental technique and with the general procedure for making sweet potato pies. After testing various custard pie recipes, the following recipes were decided upon to be used as a basic formula for use in the succeeding experiments on custard pies.

Sweet Potato Custard Pie<sup>29</sup>

1½ cups sweet potato puree	¼ tsp. nutmeg
3 eggs	¾ tsp. cinnamon
½ cup sugar	¾ cup milk
3 T. corn syrup	¼ cup melted
½ tsp. salt	margarine

Beat eggs until light, add sugar, corn syrup, salt, nutmeg, cinnamon, milk and butter, and beat until smooth; add potato puree and beat well; pour into a pastry-lined pie pan and bake at 450° F for 15 minutes to brown the sides and bottom of the crust. Then reduce the temperature to 300° F and bake 45 minutes or until a knife comes out clean when inserted. Makes one nine inch pie.

Pastry<sup>30</sup>

1 cup flour  
½ tsp. salt  
1/3 cup shortening  
2 - 3 T. cold water

Cut fat into sifted flour and salt with two knives, fork, pastry blender, or with fingers. Fat in the mixture should be about the size of rice kernels. Add water evenly to all portions, mixing with a fork. All parts should be just moist enough to hold together when pressed. Roll lightly in a ball. Flour board evenly. Rub small amount of flour over rolling pin. Roll pastry deftly so that it does not stick to board. Roll 1/8 inch thick. Bake

These recipes, with the variations described in the following experiments, were used in all experiments on sweet potato custard pies.

<sup>29</sup> J. G. Woodroof, op. cit., p. 23.

<sup>30</sup> Alice M. Child and Kathryn B. Niles, Food Preparation Recipes, New York, John Wiley and Sons, Inc.

Test of Basic Recipe - The basic recipe was used, with no variations. Whole boiled potatoes were used for puree; other ingredients and utensils were basic. The recipe was followed for mixing procedure. The pie was baked for 15 minutes at 450° F and 40 minutes at 300° F. The filling had a slightly dull color and flat taste. Texture and surface were good. Pastry was desirable in flavor, color, tenderness, and texture, but the bottom crust was soggy. (Sample 1, Table V).

Effect of Lemon Juice in Filling - In order to bring out the color and flavor of the potatoes, 3 T. lemon juice was added to the filling. Lemon juice was the last ingredient added, because its acidity partially coagulated the protein, thickening the filling mixture.<sup>31</sup> A much better flavor was obtained with the addition of lemon juice, and the color was brightened. (Sample 2, Table V)

Effect of Precooking Pastry - In an attempt to prevent sogginess of the bottom crust, pastry was prebaked for 10 minutes at 450° F, filling added, baked 10 minutes at 450° F, and then 40 minutes at 300° F. Prebaking seemed to have little effect on the sogginess of the crust. A less desirable color of crust was obtained, the crust being too brown due to prebaking. (Sample 2, Table V)

<sup>31</sup> J. G. Woodroof, op. cit., p. 23.

Effect of Different Methods of Cooking Potatoes for Puree - Potatoes were baked at 400° F for 45 minutes, boiled whole, pressure cooked whole for 4 minutes at 15 lbs., and slices boiled for 20 minutes to make puree. Baked potatoes gave the best flavor and color, but gave a less desirable texture, due to dryness. (Sample 3, Table V). There was little apparent difference between pies made from the boiled whole potatoes and the pressure cooked potatoes (Samples 4 and 5, Table V). Sliced boiled potatoes gave a product which was less desirable in color and in flavor (Sample 6, Table V).

Effect of Chilling Pastry - Pastry chilled in the refrigerator for one hour after rolling and that chilled for one hour before rolling gave similar products. Both gave desirable products, the bottom crust being less soggy than previously. Chilling pastry for several days may, however, cause excessive shrinkage during baking<sup>32</sup> (Samples 3-6, Table V).

Effect of Variation of Fat in Filling - In order to determine the relative desirability of using various fats in the filling, pies made with margarine, butter, and bacon fat were compared. Butter and bacon fat were substi-

<sup>32</sup> Osee Hughes, Introductory Foods, MacMillan Company, New York, 1940, p. 357.

tuted for margarine in equal amount. Results show that margarine and butter give similar products, and so could be used interchangeably (Samples 7 and 8, Table V). Bacon fat gave a strong flavor and dull color that may be undesirable (Sample 9, Table V), although it is used in some localities.<sup>33</sup> A smaller amount of bacon fat used for seasoning would seem to be more desirable. Other meat drippings, beef or pork, might also be used for seasoning, but probably only as partial substitution.

Effect of Temperature of Water in Pastry - When water at tap temperature, 23° C, was used in the pastry, less water could be used. The fat became softer at a higher temperature, moistening the flour. The flour did not then require as much water, and the resulting product was crumbly (Samples 7-9, Table V). Ice water seems to be more desirable for use in pastry.

Effect of Different Baking Temperatures - One sample was baked at 425° F for 15 minutes and 300° F for 40 minutes. Another was baked at 450° F for 15 minutes and 350° F for 30 minutes. A third was baked at 450° F 15 minutes and 300° F for 40 minutes. The latter was most desirable, since the first was not brown enough and had a soggy bottom crust, and the second was too brown before the

<sup>33</sup> Used in Wilkes County, North Carolina.

filling was done (Samples 10-12, Table V). The initial high temperature gives a less soggy bottom crust, since the filling is coagulated more rapidly.<sup>34</sup>

With prebaked pastry, a more desirable product was obtained when pastry was prebaked at 425° F for 7 minutes, filling added, baked at 450° F for 10 minutes, and at 300° F for 40 Minutes (Sample 14, Table V). When pastry was prebaked at 450° F for 10 minutes, filling added, baked at 450° F for 10 minutes, and 300° F for 30 minutes, the crust browned before the filling was done (Sample 13, Table V). A slightly lower initial temperature and shorter period of prebaking pastry gave a more desirable product.

Effect of Different Types of Milk in Filling - Types of milk used in this experiment were whole milk, evaporated milk diluted with one half water, skimmed milk, and powdered whole milk diluted with 1 cup of water to 4 T. milk. Whole milk, evaporated milk, and powdered milk gave similar products (Samples 15-18, Table V), and can be used interchangeably with no change in procedure. Skimmed milk gave a slightly less rich product, but could be used satisfactorily (Sample 17, Table V).

Effect of Using Pie Pans of Different Materials - Pies from the same mixture were cooked for equal lengths of time

<sup>34</sup> Osee Hughes, loc. cit.

in the same position in the electric oven. Various pans used were dull finish tin, aluminum, and pyrex pans. There was very little apparent difference in the browning of the pies in the tin pans and pyrex pans (Samples 19 and 20, Table V), but the aluminum pan gave a less brown bottom crust (Sample 21, Table V). The bright finish of the aluminum reflects radiant heat, preventing the browning of the product.<sup>35</sup>

Effect of Using Different Sweetening Agents - Brown sugar substituted for white sugar in equal amount gave a very desirable product. The flavor was richer than when white sugar was used (Sample 23, Table V). Molasses substituted for one half of brown sugar, with a decrease of 3T. in liquid, gave a product which was quite strong in flavor (Sample 24, Table V). Corn syrup substituted for one half of white sugar, with a decrease of 3 T. in liquid, gave a product very similar to that obtained from white sugar. (Sample 25, Table V). Texture was smooth and flavor was mild. Sweetness of the product was sufficient. No difference in cooking time or temperature was required.

Effect of Temperature of Fat in Pastry - Fat used at refrigerator temperature gave a desirable product

<sup>35</sup> Louise J. Peet and Lenore E. Sater, Household Equipment, New York, John Wiley and Sons, Inc., 1946, p. 177.

(Sample 22, Table V). Fat at room temperature moistened the flour, less water than is necessary to make good pastry could be used, and a slightly crumbly product was obtained (Samples 23-25, Table V).

Effect of Using A Small Amount of Molasses in Filling -

It was found most desirable to substitute 1 T. molasses for 1 T. corn syrup in the filling (Sample 28, Table V). 2 T. molasses with 1/3 cup brown sugar and a decrease of 1 T. milk gave a slightly strong molasses flavor (Sample 26, Table V). 2 T. molasses used with 1/3 cup white sugar with a decrease of 1 T. milk gave an even stronger molasses flavor (Sample 27, Table V).

Effect of Using Different Shortening Agents in Pastry -

Lard was substituted in equal amount for Crisco in pastry with desirable results (Samples 26 and 27, Table V). Lard and Crisco may be used interchangeably for pastry. Oil was substituted for Crisco, using 3/4 the amount of fat. The oil was combined with water in an emulsion and added to the flour. A slightly less tender product was obtained (Sample 28, Table V).

Effect of Using Different Types of Stoves for Baking -

It was found that different temperatures and lengths of baking time are required to obtain a standard product in different types of stoves. A temperature of 450° F for

15 minutes and 300° F. for 40 minutes gave a desirable product in an electric stove (Sample 29, Table V). In a kerosene stove, a longer cooking time was required. Pies were baked at 450° F for 15 minutes and 300° F for 45 minutes (Sample 30, Table V). In a gas stove, a temperature of 450° F for 7 minutes and 300° F for 35 minutes gave too brown a crust before the filling was done (Sample 31, Table V). A more desirable product was obtained at 425° F for 7 minutes and 300° F for 40 minutes (Sample 32, Table V).

Effect of Adding Egg Whites Separately to Filling -

Egg whites were beaten separately and folded in last. This gave a lighter, chiffon-like product, with less custard consistency (Sample 33, Table V). Lemon juice added before the addition of the egg white gave a lighter, more stable product, because the lemon juice stabilized the egg white foam as the egg whites were folded into the mixture (Samples 34 and 35, Table V).

Effect of Different Methods of Cutting Fat Into Pastry -

Fat was cut into pastry mixture with pastry blender, with two knives, and with the fingers. Pastry blender and knives were easier to manipulate and gave a slightly more desirable product (Samples 33 and 34, Table V). More handling of ingredients was required when the fingers were used, more

gluten was developed, and the resulting product was less tender (Sample 35, Table V). Skill and rapid manipulation are necessary when using fingers for cutting in fat.

Effect of Freezing Puree for Pies; Effect of Freezing Pie Mixture - Sweet potato puree, with lemon juice added, 2 T. to 1 cup puree, was frozen for two weeks. Puree was thawed for one hour and pies were made. A desirable product was obtained, with no difference noted between this product and that made from fresh puree (Sample 36, Table V).

Sweet Potato pie mixture, ready for baking, was frozen for two weeks. After thawing, it was poured into an unbaked pie shell, and baked. Results obtained were similar to those obtained from fresh potatoes (Sample 37, Table V).

#### Grated Sweet Potato Pie

Test of Basic Recipe - The following recipe, with variations, was used in all experiments on grated sweet potato pie.

#### Grated Raw Sweet Potato Pie<sup>36</sup>

2 cups grated raw sweet potatoes  
2 eggs, beaten  
1 cup sugar  
1 tsp. salt  
3/4 tsp. allspice  
2 tsp. cloves  
2 cups milk  
1/3 cup melted butter  
1 tsp. grated orange rind

36 Recipe used in Guilford County, North Carolina.

Add sugar, salt, spices, orange rind, and milk to the eggs. Mix thoroughly. Add sweet potatoes and fat. Mix well. Pour custard into 9 inch unbaked pastry shell and bake in a hot oven, 425° F, for 10 minutes. Reduce temperature to 350° F and bake for 30 minutes.

When this recipe was used without variations, results were undesirable. The flavor of orange rind was too pronounced, and the potatoes were not sufficiently cooked. The color of the filling was dull. Pastry was slightly soggy on the bottom crust (Sample 1, Table VI).

Effect of Precooking Filling - Potatoes, margarine, and milk were boiled together until potatoes were softened. Other ingredients were added and the mixture was poured into an unbaked pastry shell and baked for 10 minutes at 425° F, 35 minutes at 300° F. A more desirable product was obtained. Potatoes were sufficiently cooked, and pastry was not soggy, because the mixture was thickened before being poured into pastry shell. Flavor and color were still of poor quality (Sample 2, Table VI).

Effect of Using Lemon Juice Instead of Orange Rind - 3 T. lemon juice was added instead of orange rind. Both flavor and color were greatly improved by the addition of lemon juice (Sample 3, Table VI).

Effect of Cooking Filling Without Pastry - The mixture was cooked in custard cups, without precooking, for one hour at 300° F. A more desirable product was obtained (Sample 4,

Table VI) than when pastry was used. A longer cooking time at a lower temperature is more desirable for this product.

### Sliced Sweet Potato Pie

Test of Basic Recipe - The following recipe, with variations, was used for all experiments on sliced sweet potato pie.

#### Sliced Sweet Potato Pie<sup>37</sup>

2 cups sliced boiled sweet potatoes  
1 T. butter  
 $\frac{1}{2}$  cup water  
 $\frac{1}{4}$  tsp. cinnamon  
 $\frac{1}{4}$  tsp. nutmeg  
 $\frac{1}{2}$  cup brown sugar

Boil whole potatoes until partly done. Peel and slice into unbaked pastry shell. Dot with butter, sprinkle with brown sugar, cinnamon, and nutmeg. Add water. Cover with pastry. Bake at 425° F 10 minutes and 300° F for 30 minutes.

When this basic recipe was tested, the pie did not have enough moisture, and was not rich enough. Color was fairly good. The bottom crust was not soggy (Sample 1, Table VII).

Effect of Adding More Liquid in Filling; Effect of Using Milk as Liquid - Water was found to be more desirable as a liquid in the filling. Milk gave a pasty product with a less desirable flavor (Samples 2 and 3, Table VII). A more desirable product was obtained when

<sup>37</sup> Recipe used in Iredell County, North Carolina.

1 cup water was used as the liquid. Moisture content was proper (Sample 2, Table VII).

Effect of Adding Lemon Juice to Filling - 2 T. lemon juice was used in the filling, and a desirable color and flavor were obtained (Sample 4, Table VII).

Effect of Using Only Top Crust - A deep dish pie was made, using the Sliced Sweet Potato Pie recipe. It was found to be satisfactory and might be used when a pie with more filling and less pastry is desired (Sample 5, Table VII).

Effect of Using Different Sweetening Agents in Filling - Brown sugar, white sugar, and corn syrup were used as sweetening agents. White sugar, substituted equally for brown sugar, gave a more desirable product. (Sample 7, Table VII). Corn syrup, substituted equally for brown sugar, with reduction of liquid by  $\frac{1}{2}$  cup, gave a slightly less desirable flavor. The product was not sweet enough (Sample 8, Table VII).

Effect of Different Methods of Cooking Potatoes - Potatoes cooked whole in the skins and sliced gave a more desirable product than potatoes sliced before boiling. The latter gave a lighter color and less flavor (Samples 9 and 10, Table VII).

Sweet Potato Cobbler

Test of Basic Recipe - The following recipe, with variations, was used in the experiments on sweet potato cobbler.

Sweet Potato Cobbler<sup>38</sup>

2 cups sweet potatoes, partly boiled and sliced  
 $\frac{1}{2}$  cup white sugar  
3 T. butter  
 $\frac{1}{2}$  cup water  
 $\frac{1}{4}$  tsp. cinnamon  
 $\frac{1}{8}$  tsp. nutmeg

Place alternate layers of pastry and potatoes in a baking dish, sprinkling potatoes with sugar, butter, and spices. Pour water over top layer of potatoes, put pastry on top. Bake at 425° F for 10 minutes, 300° F for 35 minutes.

This recipe was tested, with no variations. Sweet potatoes were boiled for 15 minutes. A pyrex baking dish was used for baking. The product obtained was not moist, and the pastry in the layers between potatoes was heavy. (Sample 1, Table VIII).

Effect of Increased Liquid in Filling - When water in the filling was increased to 1 cup, a more moist and more desirable product was obtained. (Sample 2, Table VIII).

Effect of Decreased Fat in Pastry - Decreasing the fat in the pastry gave a slightly less soggy and less heavy pastry in the cobbler (Sample 3, Table VIII)

<sup>38</sup> Recipe used in Alexander County, North Carolina.

Sweet Potato Chiffon Pie

Test of Basic Recipe - The following recipe, with variations, was used in the experiments on sweet potato chiffon pie.

Sweet Potato Chiffon Pie<sup>39</sup>

1 T. gelatin	3/4 tsp. nutmeg
1/2 cup cold water	3/4 tsp. cinnamon
2 eggs, separated	1/2 tsp. salt
1/2 cup corn syrup	1 cup mashed sweet potatoes
3/4 tsp. ginger	1/2 cup milk
	1/2 cup sugar

Soak gelatin in cold water. Mix together egg yolks, syrup, spices, and salt, and sweet potatoes. Stir in milk and cook in double boiler until thick, stirring constantly. Remove from heat and add gelatin. Chill until mixture begins to congeal. Stir frequently. Beat egg whites stiff, but not dry. Gradually beat sugar into egg whites and carefully fold into first mixture. Pour into baked pastry shell. Place in refrigerator until ready to serve.

This recipe gave a product with a flat taste. The texture of the filling was desirable, and the crust was standard (Sample 1, Table IX).

Effect of Adding Lemon Juice to Filling - 2 T. lemon juice was added to the filling before cooking. A more tart flavor and brighter color were obtained (Sample 2, Table IX).

Effect of Using Different Sweetening Agents in Filling - Pies sweetened with white sugar, brown sugar, corn syrup,

<sup>39</sup> Avanelle S. Day, "Molasses Notes", American Molasses Co. Bulletin No. 39.

TABLE V  
COMPARISON OF QUALITY OF SWEET POTATO CUSTARD PIES<sup>1</sup>

Sample	Variation	Filling				Av.	Pastry						Av.	Total Av.
		Texture	Flavor	Surface	Color		Color	Plaisance	Tender-ness	Texture	Flavor	Appear-ance		
1	Basic Recipe	3.0	2.3	3.0	2.3	2.7	3.0	1.0	3.0	3.0	3.0	3.0	2.7	2.7
2	Lemon juice; precooked pastry	3.0	3.0	3.0	3.0	3.0	2.0	1.3	2.3	3.0	2.3	2.3	2.2	2.6
3	Baked potatoes; pastry chilled in pan.	2.3	3.0	3.0	3.0	2.8	3.0	2.3	3.0	3.0	3.0	3.0	2.9	2.85
4	Boiled whole potatoes; pastry same as 3.	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	2.8	2.9
5	Pressure cooked potatoes; pastry chilled, then rolled.	3.0	3.0	3.0	3.0	3.0	3.0	1.7	3.0	3.0	3.0	3.0	2.8	2.9
6	Sliced boiled potatoes; pastry same as 5.	3.0	2.0	3.0	2.0	2.5	3.0	1.7	3.0	3.0	3.0	3.0	2.8	2.6

<sup>1</sup> Average scores from three judges. See scoring system description.

TABLE V (CONTINUED)

## COMPARISON OF QUALITY OF SWEET POTATO CUSTARD PIES

Sample	Variation	Filling				Av.	Pastry						Av.	Total Av.
		Texture	Flavor	Surface	Color		Color	Moisture	Tenderness	Texture	Flavor	Appearance		
7	Margarine in filling; less water in pastry.	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.3	2.3	3.0	3.0	2.6	2.8
8	Butter in filling; pastry same as 7	3.0	3.0	3.0	3.0	3.0	3.0	1.7	2.3	2.3	3.0	3.0	2.5	2.7
9	Bacon fat in filling; pastry same as 7	3.0	1.7	3.0	2.0	2.4	3.0	2.0	2.3	2.3	3.0	3.0	2.6	2.5
10	Baked at 425° F 15 min., 300° F 40 Minutes.	3.0	3.0	3.0	3.0	3.0	2.3	1.3	3.0	3.0	3.0	3.0	2.4	2.7
11	450° F 15 min., 350° F 30 min.	2.3	3.0	2.7	3.0	2.75	3.0	2.0	3.0	3.0	3.0	3.0	2.8	2.8
12	450° F 15 min., 300° F 40 min.	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	2.8	2.9
13	Prebaked 10 min. at 450° F, 10 min. 450° F, 30 min. at 300° F	2.0	3.0	2.3	3.0	2.6	1.0	1.3	3.0	3.0	3.0	1.7	2.2	2.4

TABLE V (CONTINUED)

COMPARISON OF QUALITY OF SWEET POTATO CUSTARD PIES

Sample	Variation	Filling				Av.	Pastry						Av.	TOTAL/ Av.
		Texture	Flavor	Surface	Color		Color	Moisture	TEMPERATURE - WASS	Texture	Flavor	APPEAR- ANCE		
14	Prebaked pastry 7 min. at 425°F, 450° 10 min., 300° F 40 min.	3.0	3.0	3.0	3.0	3.0	2.3	1.7	3.0	3.0	3.0	2.7	2.6	2.3
15	Whole milk	3.0	3.0	3.0	3.0	3.0	3.0	2.3	3.0	3.0	3.0	3.0	2.9	2.95
16	Evaporated milk	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.3	3.0	3.0	2.5	2.6
17	Skimmed Milk	3.0	2.0	3.0	3.0	2.7	3.0	2.0	2.3	2.0	3.0	3.0	2.2	2.5
18	Powdered milk	3.0	3.0	3.0	3.0	3.0	3.0	1.7	2.0	2.7	3.0	3.0	2.5	2.8
19	Tin pan	3.0	3.0	3.0	3.0	3.0	3.0	2.3	3.0	3.0	3.0	3.0	2.9	2.95
20	Pyrex pan	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	2.7	3.0	3.0	2.8	2.9
21	Aluminum pan	3.0	3.0	3.0	3.0	3.0	2.3	1.7	3.0	3.0	3.0	3.0	2.7	2.85
22	White sugar	3.0	3.0	3.0	3.0	3.0	3.0	2.3	3.0	3.0	3.0	3.0	2.9	2.95
23	Brown sugar; fat in pastry at room temp.	3.0	3.0	3.0	3.0	3.0	3.0	2.3	3.0	1.7	3.0	3.0	2.7	2.85

TABLE V (CONTINUED)

## COMPARISON OF QUALITY OF SWEET POTATO GUSTARD PIES

Sample	Variation	Filling				Av.	Pastry						Av.	TOTAL/ AV.
		Texture	Flavor	Surface	Color		Color	Moisture	Tenderness	Texture	Flavor	Appearance		
24	$\frac{1}{2}$ molasses, $\frac{1}{2}$ brown sugar; pastry same as 23.	3.0	1.7	3.0	2.3	2.5	3.0	2.3	2.7	2.0	3.0	3.0	2.7	2.6
25	Corn syrup; pastry same as 23.	3.0	2.3	3.0	3.0	2.8	3.0	2.0	3.0	2.0	3.0	3.0	2.7	2.75
26	2 T. molasses, brown sugar.	3.0	2.0	3.0	2.3	2.6	3.0	2.3	3.0	3.0	3.0	3.0	2.9	2.75
27	2 T. molasses, white sugar; Lard in pastry	3.0	1.7	3.0	2.7	2.6	3.0	2.0	3.0	3.0	3.0	3.0	2.8	2.7
28	1 T. molasses, brown sugar; Oil in pastry	3.0	2.7	3.0	2.7	2.8	3.0	2.3	2.0	3.0	3.0	3.0	2.7	2.75
29	Electric stove, 450° 15 min., 300° 40 min.	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	2.8	2.9
30	Kerosene stove, 450° F 15 min., 300° F 45 min.	3.0	3.0	3.0	3.0	3.0	3.0	2.3	3.0	3.0	3.0	3.0	2.9	2.95

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TABLE V (CONTINUED)  
COMPARISON OF QUALITY OF SWEET POTATO CUSTARD PIES

Sample	Variation	Filling				Av.	Pastry						Av.	Total Av.
		Texture	Flavor	Surface	Color		Color	Moisture	Tender-ness	Texture	Flavor	Appearance		
31	Gas stove, 450° F 7 min., 300° F 35 min.	2.0	3.0	2.0	3.0	2.5	2.0	2.3	3.0	3.0	3.0	2.3	2.6	2.55
32	Gas stove, 425° F 7 min., 300° F 40 min.	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	2.8	2.9
33	Egg whites added separately; pastry blender	3.0	3.0	3.0	3.0	3.0	3.0	2.3	3.0	3.0	3.0	3.0	2.9	2.95
34	Lemon juice before egg white; knives for pastry	3.0	3.0	3.0	3.0	3.0	3.0	2.3	3.0	3.0	3.0	3.0	2.9	2.95
35	Lemon juice after egg white; fingers for pastry	2.7	3.0	2.3	3.0	2.7	3.0	2.3	2.0	2.0	3.0	3.0	2.6	2.65
36	Frozen puree	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	2.8	2.9
37	Frozen filling	3.0	3.0	3.0	3.0	3.0	3.0	2.3	3.0	3.0	3.0	3.0	2.9	2.95

TABLE VI  
COMPARISON OF QUALITY OF GRATED SWEET POTATO PIES<sup>1</sup>

Sample	Variation	Filling					Av.	Pastry					Av.	TOTAL/ Av.
		Tenderness	Flavor	Surface	Color	Color		Moisture	Tenderness	Terrure	Flavor	Appearance		
1	Basic Recipe	1.0	1.0	3.0	2.0	1.8	3.0	2.0	3.0	3.0	3.0	3.0	2.8	2.3
2	Precooked filling.	2.7	2.0	3.0	2.0	2.4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.7
3	Lemon juice added, orange rind omitted	2.7	3.0	3.0	3.0	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.95
4	Cooked in custard cups, 300° F for one hour.	3.0	3.0	3.0	3.0	3.0								3.0

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<sup>1</sup> Average scores from three judges. See scoring system description.

TABLE VII  
COMPARISON OF QUALITY OF SLICED SWEET POTATO PIES<sup>1</sup>

Sample	Variation	Filling				Av.	Pastry						Av.	Total/ Av.
		Moisture	Color	Flavor	SWEE- NESS		Color	Moisture	TENDER- NESS	Texture	FLAVOR	APPEAR- ANCE		
1	Basic Recipe	1.0	2.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.5
2	1 cup water in filling, 3 T. fat	3.0	2.0	2.7	3.0	2.7	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.85
3	1 cup milk in filling.	3.0	2.0	1.0	3.0	2.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.6
4	Lemon juice in filling	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5	Deep dish pie	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6	Brown Sugar	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
7	White Sugar	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
8	Corn syrup	3.0	3.0	2.0	2.0	2.7	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.85
9	Boiled whole potatoes.	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
10	Boiled slices of potatoes.	3.0	2.0	2.0	3.0	2.7	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.85

<sup>1</sup> Average scores from three judges. See scoring system description.



TABLE IX  
COMPARISON OF QUALITY OF SWEET POTATO CHIFFON PIES<sup>1</sup>

Sample	Variation	Filling				Av.	Pastry						Av.	TOTAL/ Av.
		Texture	Color	Flavor	Consistency		Color	Moisture	TENDERNESS	Texture	Flavor	Appearance		
1	Basic Recipe	3.0	2.0	2.0	3.0	2.7	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.85
2	Lemon juice added to filling	3.0	3.0	2.7	3.0	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.95
3	Lemon juice added to puree	3.0	3.0	2.7	3.0	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.95
4	Corn syrup	3.0	3.0	2.3	3.0	2.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.9
5	White sugar	3.0	3.0	2.0	2.0	2.7	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.85
6	Brown sugar	3.0	3.0	1.7	2.0	2.4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.7
7	Molasses	3.0	1.0	1.0	2.0	1.75	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.4

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<sup>1</sup> Average scores from two judges. See scoring system description.

and molasses were compared. When white sugar and brown sugar were substituted for corn syrup in equal amount, the liquid was increased by  $\frac{1}{4}$  cup. Molasses was substituted in equal amount. White sugar gave a product similar to that obtained from corn syrup, except slightly less tender in filling (Sample 5, Table IX). Brown sugar gave a less desirable flavor (Sample 6, Table IX), and molasses gave a strong, undesirable flavor (Sample 7, Table IX).

#### Summary

The experiments conducted may be summarized as follows:

1. Standard recipes have been obtained for sweet potato custard pie, grated sweet potato pie, sliced sweet potato pie, sweet potato cobbler, and sweet potato chiffon pie. (See Appendix)

2. Lemon juice used in any type of sweet potato pie improves both color and flavor;

3. Margarine and butter may be used interchangeably in pie fillings. Meat drippings may be used in small amounts if their flavor is desirable.

4. Powdered whole milk and evaporated milk may be substituted for whole milk in pie fillings. Skimmed milk gives a less rich product.

5. Brown sugar, white sugar, and corn syrup may be used interchangeably in sweet potato pie fillings. Variations are necessary in the amount of liquid used.

Molasses can be used in small amounts as flavoring in the filling.

6. Different types of stoves may be used for cooking pies, with slight variations in cooking time and temperature.

7. Sweet potato puree, sliced sweet potatoes, and sweet potato custard filling may be frozen for use in pies.

8. Boiled whole potatoes and pressure cooked whole potatoes are most desirable for making puree for pies. Baked potatoes may be used.

9. Egg whites may be added separately to sweet potato custard pie filling to give a lighter product.

10. Boiled whole potatoes are best for use in sliced sweet potato pies.

11. Grated Sweet Potato custard is best when cooked without the pastry, at a lower temperature and for a longer time than that used for pies.

12. Fat may be cut into pastry with a pastry blender, two knives, or the fingers. The use of fingers requires more skill.

13. Fat and water at refrigerator temperature are most desirable for use in pastry.

14. Chilling pastry reduces sogginess of bottom crust.

15. Prebaking of pastry is not desirable in custard pies.

16. Pie pans made of pyrex and tin are best for browning bottom of crust.

17. Lard and vegetable shortenings may be used interchangeably in pie crust. Oil gives a less desirable product in cold water pastry.

Although standard recipes have been obtained for each kind of sweet potato pie, and some variations have been tested, there remain many variations to be studied. In order to prevent sogginess of the bottom crust in custard pies, which was never entirely overcome, additional experiments might be carried out.

Since there is quite a difference in moisture content and flavor of different varieties of sweet potatoes, it is probable that there would be variations in products obtained with different varieties. The different varieties were not available for these experiments, but it would be desirable to conduct further experiments on that factor.

Further experiments are possible on freezing sweet potatoes and sweet potato pies. A great deal of work has been done on this subject by the Georgia Agricultural Experiment Station<sup>40</sup>, but the freezing industry is so new that many new factors make possible continued experiments on the freezing of sweet potatoes.

Since many factors may influence the quality of pastry, it would be possible to conduct an entire series of experiments on these factors.

<sup>40</sup> J. G. Woodroof, op. cit.

Due to the shortage of time, only one experiment has been performed on each variable. If more time were available, it would be desirable to perform several experiments on each variable, in order to be certain that results are correct and are due to the variable being introduced.

## CHAPTER V

### Conclusion and Recommendations

This study has been a preliminary one. It has shown the variety possible in sweet potato cookery and the methods of preparation most desirable from the standpoint of palatability. Future work may be carried on to determine the nutritive value of sweet potatoes when they are prepared by various methods. These future studies will show more fully the significance of sweet potatoes in the diet, and will show which methods of preparation are most desirable from the standpoint of nutritive value. When this is done, it will be possible to see the real significance of sweet potatoes, both in menu planning and in nutrition.

## APPENDIX

### Popular Summary and Recipes<sup>41</sup>

Among Southern cooks, every recipe collection gives place to unusual and interesting sweet potato dishes. The sweet potato, grown abundantly in the South, serves as a basic food in the diet, adds interest to meals, and provides a rich source of food nutrients.

Sweet potatoes, especially the deep yellow and orange ones, are high in Vitamin A value, and this vitamin is not readily lost during cooking. Vitamin C values also are high, and there are small amounts of the B Vitamins. Energy value is high, due to the starch and sugar.

In selecting sweet potatoes for cooking, choose the light yellow colored ones for dry, mealy potatoes. For moist, sugary potatoes, choose the deep orange-red ones. They are often called yams.

Don't keep the sweet potatoes too long in the home, but if they are kept, choose a cool, dry place. They rot easily.

If you must peel the potatoes before cooking - and it's best not to - peel them just before using. Otherwise, they turn dark and are unappetizing. If the potatoes turn dark after cooking, add a little lemon juice. It restores color and brings out the flavor, also.

<sup>41</sup> For possible use as a popular consumer's bulletin on Sweet Potato Cookery.

In serving sweet potatoes, treat the family to variety. The following recipes show the many possible ways of cooking sweet potatoes and preparing them for serving; they can add interest to your meals.

Served as a Vegetable

Boiled

Boil sweet potatoes in a covered container for 20 to 30 minutes or until tender. Drain at once. Peel and season with table fat or meat drippings; salt and pepper to taste.

Baked

Wash and dry potatoes, and rub the skins with fat. Bake in a hot oven, 425° F 30 to 60 minutes, depending upon the size. Serve with table fat.

Baked Stuffed<sup>42</sup>

Cut large baked sweet potatoes in half lengthwise. Carefully scoop out the inside, leaving a little of the sweet potato as a lining for the skins. Mash as for plain mashed sweet potatoes, adding table fat, seasonings, and hot milk. Stuff back into the shells, brush the top with melted fat, and reheat in a hot oven, 425° F, for 5 minutes.

For variety, add chopped cooked meat or chopped nuts. Grated orange rind and orange juice may be used as flavoring.

Fried

Peel and slice baked or boiled sweet potatoes. Brown in a small amount of fat. Bacon fat may be used for browning.

<sup>42</sup> "Sweet Potato Recipes", U. S. Department of Agriculture Bulletin AIS-53, October 1946.

### Mashed Sweet Potatoes

Peel hot cooked sweet potatoes. Mash thoroughly and add table fat. Beat in hot milk until sweet potatoes are fluffy.

For variety, add nuts, raisins, or orange juice to the mashed potatoes. Marshmallows may be used to top the potatoes, or they may be covered with meringue and browned lightly in a moderate oven, 325° F.

### Sweet Potato Balls<sup>43</sup>

Boil sweet potatoes in their skins until tender. Remove skins, mash and season with salt, butter, and milk. Form a ball, with a half marshmallow in the center, then roll in bread crumbs or cereal flakes. Fry in deep fat until crisp and brown, or place in the oven to brown.

Nuts and spices may be added to the mashed potatoes.

### Candied Sweet Potatoes

6 medium sized sweet potatoes	4 T. butter
$\frac{1}{2}$ cup water	$\frac{1}{2}$ tsp. salt
1 cup sugar(white)	

Boil potatoes until almost done. Peel and cut in quarters lengthwise. Add a syrup made of the sugar, water, butter, and salt. Bake in a moderate oven, 350° F, 20 to 30 minutes, basting frequently with the syrup.

Brown sugar may be substituted for white sugar, or corn syrup or honey may be substituted for the sugar and water. Orange juice or lemon juice may be added to give tartness.

Sweet potatoes may be candied in a frying pan on top of the stove, if a low heat is used.

<sup>43</sup> "Sweet Potatoes - How to Use Them", N. C. Agricultural Extension Service Miscellaneous Pamphlet 79, October 1944.

Sweet Potato Souffle<sup>44</sup>

2 cups mashed sweet potatoes	2 eggs, separated
$\frac{1}{2}$ tsp. salt	1 tsp. nutmeg
1 cup hot milk	$\frac{1}{2}$ cup raisins
2 T. sugar	$\frac{1}{2}$ cup broken nut
2 T. butter	meats

Mash cooked sweet potatoes well. Scald milk, add sugar, salt, and butter to milk. Mix milk with the potatoes and beat until light and fluffy. Separate the eggs, beat yolks, and add to the potato. Add the nutmeg, raisins, and nuts. Cut and fold lightly into the potato mixture the stiffly beaten egg whites. Pour into a buttered baking dish and arrange marshmallows one half inch apart on the top, if desired. Put in a moderate oven, 350° F, and bake 35 to 40 minutes, until the souffle is set. Serve at once.

Sweet Potatoes in DessertsSweet Potato Custard Pie<sup>45</sup>

1 $\frac{1}{2}$ cups sweet potato puree	$\frac{1}{2}$ tsp. nutmeg
3 eggs	$\frac{3}{4}$ tsp. cinnamon
$\frac{1}{2}$ cup sugar(brown)	$\frac{3}{4}$ cup milk
3 T. corn syrup	$\frac{1}{4}$ cup melted margarine
$\frac{1}{2}$ tsp. salt	3 T. lemon juice

Beat eggs until light, add sugar, corn syrup, salt, nutmeg, cinnamon, milk and butter, and beat until smooth; add potato puree and beat well; pour into a pastry-lined pie pan and bake at 450° F for 15 minutes. Reduce the temperature to 300° F and bake 40 minutes or until a knife comes out clean when inserted. Makes one nine inch pie.

White sugar may be substituted for brown sugar. Corn syrup may be substituted for one half of sugar, with a reduction of 3 T. in liquid.

<sup>44</sup> "Sweet Potatoes - How to Use Them", N. C. Pamphlet.

<sup>45</sup> Recipe developed in experimental study on sweet potato pies.

Pastry<sup>46</sup>

1 cup flour  
 $\frac{1}{2}$  tsp. salt  
 $\frac{1}{3}$  cup shortening  
3 T. cold water

Cut fat into sifted flour and salt with two knives, fork, pastry blender, or with fingers. Fat in the mixture should be about the size of rice kernels. Add water evenly to all portions, mixing with a fork. All parts should be just moist enough to hold together when pressed. Roll lightly in a ball. Flour board evenly. Rub a small amount of flour over rolling pin. Roll pastry deftly so that it does not stick to board. Roll  $\frac{1}{8}$  inch thick. Bake.

Grated Raw Sweet Potato Pie<sup>47</sup>

2 cups grated raw sweet potatoes  
2 eggs, beaten  
 $\frac{1}{2}$  cup sugar  
 $\frac{1}{2}$  tsp. salt  
 $\frac{3}{4}$  tsp. allspice  
 $\frac{1}{4}$  tsp. cloves  
2 cups milk  
 $\frac{1}{3}$  cup margarine  
3 T. lemon juice

Boil potatoes, margarine, and milk together until the potatoes are softened. Add sugar, salt, spices, and lemon juice and mix. Pour mixture into an unbaked pastry shell, bake for 10 minutes at 425° F and 35 minutes at 300° F.

Mixture may be cooked in custard cups, without pastry. Do not precook the mixture. Add sugar, salt, spices, lemon juice, and milk to the eggs. Mix thoroughly. Add sweet potatoes and melted fat. Pour into custard cups and bake for one hour at 300° F.

<sup>46</sup> Recipe developed in experimental study on sweet potato pies.

<sup>47</sup> Recipe developed in experimental study.

Sliced Sweet Potato Pie<sup>48</sup>

2 cups sliced boiled sweet potatoes  
1 T. butter  
1 cup water  
 $\frac{1}{4}$  tsp. cinnamon  
 $\frac{1}{4}$  tsp. nutmeg  
 $\frac{1}{2}$  cup white sugar  
2 T. lemon juice

Boil whole potatoes until partly done. Peel and slice into unbaked pastry shell. Dot with butter, sprinkle with brown sugar, cinnamon, and nutmeg. Add water and lemon juice. Cover with pastry. Bake at 425° F for 10 minutes and 30 minutes at 300° F.

This recipe may also be used for making a deep dish pie.

Sweet Potato Cobbler<sup>49</sup>

2 cups sweet potatoes, partly boiled and sliced  
 $\frac{1}{2}$  cup white sugar  
3 T. butter  
1 cup water  
 $\frac{1}{4}$  tsp. cinnamon  
 $\frac{1}{4}$  tsp. nutmeg

Place alternate layers of pastry and potatoes in a baking dish, sprinkling potatoes with sugar, butter, and spices. Pour water over top layer of potatoes, put pastry on top. Bake at 425° F for 10 minutes, 300° for 35 minutes.

Reduce fat in pastry to  $\frac{1}{4}$  cup fat for 1 cup flour.

<sup>48</sup> Recipe developed in experimental study.

<sup>49</sup> Recipe developed in experimental study.

Sweet Potato Chiffon Pie<sup>50</sup>

1 T. gelatin	3/4 tsp. cinnamon
1/4 cup cold water	1/2 tsp. salt
2 eggs, separated	1 cup mashed sweet potatoes
1/2 cup corn syrup	1 cup milk
3/4 tsp. ginger	1 cup sugar
3/4 tsp. nutmeg	2 T. lemon juice

Soak gelatin in cold water. Mix together egg yolks, syrup, spices, and salt, and sweet potatoes. Stir in milk and cook in double boiler until thick, stirring constantly. Remove from heat and add gelatin. Chill until mixture begins to congeal. Stir frequently. Beat egg whites stiff, but not dry. Gradually beat sugar into egg whites and carefully fold into first mixture. Pour into baked pastry shell. Place in refrigerator until ready to serve.

White sugar may be substituted for corn syrup, with an increase of  $\frac{1}{4}$  cup in milk.

Caramel Sweet Potato Pudding<sup>51</sup>

2 cups mashed sweet potatoes
1/4 cup butter or margarine
1/2 cup brown sugar
1/2 cup nut meats

Melt butter in an iron frying pan. Add sugar, and stir while sugar is dissolving. Add nut meats, and spread the mashed potatoes in the frying pan. Place the frying pan in a moderate oven, 350° F, and bake 30 minutes. Invert on a plate and serve with caramel on top. Serve with whipped cream.

<sup>50</sup> Recipe developed in experimental study.

<sup>51</sup> Recipe used in Georgia.

Sweet Potato Cake<sup>52</sup>

2/3 cup fat	1 cup chopped nuts
1 cup granulated sugar	2 eggs
1 cup brown sugar	3 tsp. baking powder
1 cup hot mashed sweet potatoes	1 tsp. each cloves, cinnamon, nutmeg
2 cups flour	1 tsp. vanilla
1/2 cup sweet milk	

Cream fat and sugar. Add egg yolks, potatoes, spices, and vanilla. Add milk alternately with flour and baking powder sifted together. Fold in egg whites, stiffly beaten, and add nuts rolled in flour. Bake in a loaf in a moderate oven, 350° F for 45 minutes. Serve with whipped cream.

Sweet Potato Drop Cookies<sup>53</sup>

1/2 cup fat	1 tsp. salt
1 1/2 cup sugar	1 tsp. cinnamon
1 egg, beaten	1 tsp. cloves
2 cups mashed sweet potatoes	1/2 tsp. nutmeg
2 cups flour	1/2 cup raisins
4 tsp. baking powder	

Cream fat and sugar. Add beaten egg, mashed potatoes, dry ingredients sifted together, and raisins. Mix well. Drop from spoon onto greased baking sheet and bake in moderate oven, 350° F for 20 minutes or until brown.

<sup>52</sup> Recipe used in Alexander County, North Carolina.

<sup>53</sup> C. Rose and B. Brown, America Cooks, New York, W. W. Norton and Co., Inc., 1940, p. 454.

Sweet Potato Ice Cream<sup>54</sup>

1 cup mashed sweet potatoes    1 tsp. vanilla  
 1 cup thick whipping cream    ½ tsp. salt  
 ¾ cup sugar  
 2 egg whites

Boil potatoes, peel, and mash. Measure and allow to cool. Add to the potatoes one half the sugar, the salt, and vanilla. Beat egg whites slightly stiff, add the remaining sugar, and beat until stiff. Whip cream, add meringue and cream to potato mixture, folding together until well mixed. Pour into freezing tray. Place in freezing zone of refrigerator until frozen.

Chopped nuts and maraschino cherries may be used for variety.

Sweet Potato Fudge Blocks<sup>55</sup>

¼ cup fat	4 tsp. baking powder
¼ cup sugar	1 tsp. cinnamon
1 egg, separated	½ tsp. cloves
1 cup mashed sweet potatoes	½ tsp. nutmeg
2 T. melted chocolate	¼ tsp. salt
¼ cup milk	¼ cup raisins
1 cup flour	¼ cup nuts

Cream fat and sugar. Add beaten egg yolk and mix well. Add mashed potato, melted chocolate, and milk. Add sifted dry ingredients, mix well, and fold in beaten egg white. Add nuts and raisins. Bake in greased shallow loaf pans, and cut in squares. Frost if desired.

<sup>54</sup> Mrs. S. R. Dull, Southern Cooking, New York, Grosset and Dunlap, 1928, p. 229.

<sup>55</sup> C. Rose and B. Brown, op. cit., p. 456.

Sweet Potato BreadsSweet Potato Biscuits<sup>56</sup>

1 cup sifted all-purpose flour  
 1 cup mashed sweet potatoes  
 4 tsp. baking powder  
 1 tsp. salt  
 4 T. shortening  
 4 T. milk

Sift together dry ingredients. Cut in fat with two knives or a pastry blender. Add sweet potatoes and milk to make a soft dough. Knead lightly. Roll to  $\frac{1}{2}$  inch thickness, cut in rounds, and place on a baking sheet. Bake in a hot oven, 425° F, 15 to 20 minutes.

Sweet Potato Rolls<sup>57</sup>

1 cup mashed sweet potatoes	$\frac{1}{2}$ cup sugar
1 cup warm water	2 tsp. salt
1 cup scalded milk	2 beaten eggs
1 cake yeast	6 to 7 cups flour
$\frac{1}{2}$ cup shortening	

Mix potatoes, water, and milk and allow to cool. Add crumbled yeast. Cream shortening and sugar. Add salt and eggs. Add this to first mixture, along with flour, using enough to make a stiff dough. Knead until smooth, and allow to rise until double in bulk. Roll into a 1 inch sheet. Sprinkle thickly with cinnamon and brown sugar. Roll as jelly roll, and cut in 1 inch pieces. Place pieces just touching on a deep sided greased pan. Let rise until double in bulk. Bake in a moderate oven, 375° F, for 20 to 30 minutes. Glaze with confectioners sugar and water mixed to a spreading consistency.

<sup>56</sup> Recipe developed in experimental study.

<sup>57</sup> Lois L. Sumption and Marguerite L. Ashbrook, Breads and More Breads, Peoria, Illinois, Manual Arts Press, 1941, P. 47.

Sweet Potato Waffles<sup>58</sup>

1 $\frac{1}{4}$ cups flour	2 eggs, beaten separately
4 tsp. baking powder	1 cup mashed potatoes
1/8 tsp. cinnamon	1 cup milk
2 T. sugar	$\frac{1}{2}$ cup melted butter
$\frac{1}{2}$ tsp. salt	

Add beaten egg yolks, potatoes, milk, and melted shortening to sifted dry ingredients. Mix well. Fold in stiffly beaten egg whites, and bake.

Combination Dishes With Sweet Potatoes

Sweet Potato and Apple Scallop<sup>59</sup>

3 medium sized sweet potatoes  
 3 medium sized apples  
 $\frac{1}{8}$  tsp. salt  
 2 T. sugar  
 2 T. fat  
 $\frac{1}{2}$  cup water

Boil sweet potatoes until partly tender and peel. Slice sweet potatoes and raw apples in layers in a greased baking dish. Sprinkle the apple layers with sugar and a little salt; dot with fat. Pour in water. Bake covered in a moderately hot oven, 375° F, for 30 to 40 minutes or until apples are tender. If desired, uncover dish during last 15 minutes of cooking and top with cornflakes or breadcrumbs combined with a little fat.

For variety, use ham instead of apples, omitting the sugar. Ham should be cooked and chopped. Chopped nuts may be used instead of apples. Sliced pears, peeled orange slices, or cranberry sauce may be used instead of apples.

<sup>58</sup> L. Sumption and M. Ashbrook, op. cit., p. 87.

<sup>59</sup> "Sweet Potato Recipes", War Food Administration, Office of Distribution Circular.

Sweet Potato in Apple Shells<sup>60</sup>

Red baking apples - 6	3 T. butter
$\frac{1}{2}$ cup brown sugar	3 T. cream
3 cups mashed sweet potatoes	

Cut apples in half crosswise. Remove core and seeds; sprinkle cavity with half of the brown sugar. Place in a shallow pan containing a little water and bake in a hot oven, 400° F, for 10 to 20 minutes or until almost tender. Scoop out pulp, leaving a shell about  $\frac{1}{2}$  inch thick; reserve pulp.

To hot mashed sweet potatoes add apple pulp, butter, and cream; season to taste. Beat until fluffy. Pile sweet potato mixture lightly into apple shells or force through a decorating tube. Place in a shallow pan and sprinkle with remaining brown sugar. Pour a little melted butter over tops. Heat under broiler or in a hot oven, 400° F, until lightly browned. Makes 6 servings.

Sweet Potatoes and Cranberries<sup>61</sup>

6 large sweet potatoes	$\frac{1}{3}$ cup brown sugar
$\frac{1}{2}$ cup cranberry sauce	1 tsp. salt
3 T. butter	$\frac{1}{2}$ cup finely chopped nuts

Boil sweet potatoes, peel, and cut in halves lengthwise. Scoop out halves slightly. Place 6 halves in greased baking dish, fill centers with cranberry sauce and top with remaining halves. Melt butter, add sugar, salt, nuts, and spread over potatoes. Bake in a moderate oven, 350° F, for 20 to 25 minutes, or until lightly browned.

<sup>60</sup> Recipe used in Catawba County, North Carolina.

<sup>61</sup> Home Institute of New York Herald Tribune, America's Cookbook, New York, Charles Scribner's Sons, 1937, p. 483.

Grilled Sweet Potatoes with Applesauce<sup>62</sup>

6 hot cooked sweet potatoes  
4 T. melted butter or margarine  
2 cups apple sauce

Cut hot peeled potatoes in half lengthwise, arrange in a shallow baking dish, and brush with 2 T. of the butter. Bake in hot oven, 425° F for 15 minutes. Add remaining 2 T. butter to apple sauce, which has been sweetened to taste, and pour over sweet potatoes. Bake 15 minutes longer.

Sweet Potatoes and Pineapple<sup>63</sup>

4 medium sized sweet potatoes  
1 cup brown sugar  
1 cup drained crushed pineapple  
1 T butter  
cinnamon and nutmeg

Cook, peel, and mash potatoes. Mix with pineapple and seasoning. Place in greased baking dish, dot with butter and scatter sugar over it. Bake in a hot oven, 425° F for 15 minutes.

Ham Smothered With Sweet Potatoes<sup>64</sup>

1 slice of ham about  $\frac{1}{2}$  inch thick      2 T. sugar  
Sweet potatoes, sliced                      1 cup hot water

Brown the ham slightly on both sides and place in a baking dish. Place raw sliced sweet potatoes over the ham and sprinkle with sugar. Add hot water to the drippings in the frying pan and pour over the ham and sweet potatoes. Cover and bake in a moderate oven, 350° F, until the ham is tender. Taste occasionally with the gravy and near the end of the cooking period, remove the cover and allow the potatoes to brown on top.

<sup>62</sup> Good Housekeeping CookBook, New York, Farrar and Rinehart, 1942, P. 442.

<sup>63</sup> Recipe used in Alexander County, North Carolina.

<sup>64</sup> "Sweet Potatoes - How to Use Them", N. C. Pamphlet.

## BIBLIOGRAPHY

### A. Books

Alice Bradley, Desserts, Boston, M. Barrows and Co., 1930, Chpt. XI.

Alberta Dent, Fundamentals of Nutrition and Dietetics, New York, John Wiley and Sons, Inc., 1943, p. XIV.

Department of Food Economics and Nutrition, Kansas State College of Agriculture, Practical Cookery and the Etiquette and Service of the Table, Manhattan, Kansas, Kansas State College, 1939, p. 271.

S. R. Dull, Southern Cooking, New York, Grosset and Dunlap, 1928, pp. 202, 208, 229.

Fannie M. Farmer, Boston Cooking School Cookbook, Boston, Little, Brown and Co., 1936, p. 430.

Meta Given, Modern Family Cookbook, Chicago, J. G. Ferguson and Associates, 1942, p. 326.

Good Housekeeping Cookbook, New York, Farrar and Rinehart, Inc., 1942, p. 442.

Evelyn Halliday and Isabel Noble, Hows and Whys of Cooking, Chicago, University of Chicago Press, 1939, Chpt. VII.

Evelyn G. Halliday and Isabel T. Noble, Food Chemistry and Cookery, Chicago, University of Chicago Press, 1943, Chpt. II.

Florence L. Harris and Ruth Adele Henderson, Foods, Boston, Little, Brown and Co., 1938, p. 194.

Jessie W. Harris and Elizabeth Lacey Speer, Everyday Foods, Boston, Houghton Mifflin Co., 1941, p. 507.

Marjorie Heseltine and Ula M. Dow, Good Cooking, Boston, Houghton Mifflin Co., 1936.

Home Institute of New York Herald Tribune, America's Cookbook, New York, Charles Scribner's Sons, 1937, p. 483.

Mrs. B. C. Howard, Fifty Years In a Maryland Kitchen, New York, M. Barrows and Co., Inc., 1944, p. 201.

Osee Hughes, Introductory Foods, New York, MacMillan Co., 1940, p. 357.

Belle Lowe, Experimental Cookery, New York, John Wiley and Sons, Inc., 1946.

Annie Louise MacLeod and Edith H. Nason, Chemistry and Cookery, New York, McGraw-Hill Book Co., Inc., 1930, p. 230.

Agnes Fay Morgan and Irene Sanborn Hall, Experimental Food Study, New York, Farrar and Rinehart, Inc., 1938, Chpt. XV.

Edith H. Nason, Introduction to Experimental Cookery, New York, McGraw-Hill Book Co., 1939, Chpt. I.

Louise Jenison Peet, and Lenore E. Sater, Household Equipment, New York, John Wiley and Sons, Inc., 1946, p. 177.

Blanche Rhett, Lettie Gay, and Helen Woodward, 200 Years of Charleston Cooking, New York, Harrison, Smith, and Robert Haas, 1934, p. 104.

Irma S. Rombauer, The Joy of Cooking, New York, Bobbs-Merrill Co., 1943, p. 253.

Cora Rose, Bab Brown, America Cooks, New York, W. W. Norton and Co., Inc., 1940, pp. 454, 456.

Louise Stanley and Jessie Alice Cline, Foods, Their Selection and Preparation, Boston, Ginn and Co., 1935, Chpt. XXII.

Lois L. Sumption, Marguerite L. Ashbrook, Breads and More Breads, Peoria, Illinois, Manual Arts Press, 1941, pp. 47, 69, 87, 102.

Elizabeth Sutherland and P. Mabel Nelson, Food Preparation Principles and Procedures, St. Louis, John S. Swift Co., Inc., 1944, p. 253.

Marion D. Sweetman, Food Selection and Preparation, New York, John Wiley and Sons, Inc., 1943, p. 452.

Susan F. West and Louise Sobye, Handbook of Food Preparation, New York, MacMillan Co., 1937, Chpt. VI.

Jennie S. Wilmot and Margaret Q. Batjer, Food for the Family, Chicago, J. B. Lippincott Co., 1944, p. 418.

Alice B. Winn-Smith, Thrifty Cooking for Wartime, New York, MacMillan Co., 1942, p. 107.

Woman's Home Companion Cookbook, New York, P. F. Collier and Son Corp., 1942, p. 369.

#### B. Periodicals

Vernon H. Cheldelin, Alethea M. Woods, Roger I. Williams, "Loss of B. Vitamins Due to Cooking of Foods", Journal of Nutrition XXVI, 1943, p. 477.

Minna C. Denton, "Lard and Lard Substitutes in Household Pastry Making", Journal of Home Economics XIII, 1921, p. 549.

Martha E. Hollinger, "Ascorbic Acid of the Sweet Potato As Affected by Variety, Storage, and Cooking", Food Research IX, 1944, p. 76.

Caroline B. King, "Some Southern Sweet Potato Dishes", Ladies Home Journal XXXVI, September 1929, p. 130.

Robert L. Lane, Elizabeth Johnson, and Robert R. Williams, "Studies of the Average American Diet, I - Thiamin Content", Journal of Nutrition XXIII, 1942, p. 613.

Florence L. MacLeod, Aileen Talbert, and Leetie E. Toole, "Vitamin A and B Content of the Nancy Hall Sweet Potato", Journal of Home Economics XXIV, October 1932, p. 923.

Catherine L. Newton and Georgia C. Lowry, "Vitamin C Content of the Puerto Rico Sweet Potato", Journal of Home Economics XXIX, February 1937, p. 114.

P. B. Pearson and R. W. Luecke, "The B. Vitamin Content of Raw and Cooked Sweet Potatoes", Food Research X, 1945, p. 325.

Armstrong Perry, "Plantation Sweet Potato Recipes", Better Homes and Gardens XVI, October 1937, p. 81.

Walter C. Russell, M. Wright Taylor, Jack F. Beuk, "Nicotinic Acid Content of Common Fruits and Vegetables As Prepared for Human Consumption", Journal of Nutrition XXV, 1943, p. 275.

Florence I. Scoular and Dorothy H. Eakle, "Loss of Ascorbic Acid During Cooking of Stored Sweet Potatoes", Food Research VIII, March, April 1943, p. 156.

Pearl Swanson, Gladys Stevenson, E. S. Haber, and P. Mabel Nelson, "Effect of Fertilizing Treatment on Vitamin A Content of Sweet Potatoes", Food Research V, 1940, p. 431.

L. J. Tepley, F. M. Strong, and C. A. Elvehjem, "The Distribution of Nicotinic Acid in Foods", Journal of Nutrition XXIII, 1942, p. 417.

Mildred S. Van de Mark and L. M. Ware, "Candies From Sweet Potatoes Pack Health-Promoting Values", Food Industries XIX, September 1947, p. 34.

J. G. Woodroof and Ida S. Atkinson, "Freezing Provides An Answer to Sweet Potato Problems", Food Industries XVI, September 1944, p. 714.

#### C. Bulletins, Pamphlets, and Circulars

B. C. Brunstetter, How to Make Sweet Potato Chips, Mimeographed Sheet of U. S. Department of Agriculture, Bureau of Plant Industry, December 1936.

Avanelle S. Day, Molasses Notes, American Molasses Co. Bulletin 39.

Sallie F. Hill, Selected Southern Recipes, Home Dept., Progressive Farmer Bulletin.

Influence of Cooking Processes on Food Nutrients, N. C. Agricultural Experiment Station Technical Bulletin No. 91, May 1946.

E. J. Lease and J. H. Mitchell, Biochemical and Nutritional Studies of Dehydrated Sweet Potato, S. C. Agricultural Experiment Station Bulletin 329, June 1940.

Margaret C. Smith, Helen Wiseman, Emily Caldwell, and Helen Farrankop, Ascorbic Acid and Carotene Content of Three Varieties of Sweet Potatoes Grown in Arizona and Their Losses During Storage, University of Arizona Agricultural Experiment Station Mimeographed Report No. 71, April 1945.

M. Speirs, H. L. Cochran, W. J. Peterson, F. W. Sherwood, and J. G. Weaver, The Effects of Fertilizer Treatments, Curing, Storage, and Cooking on the Carotene and Ascorbic Acid Content of Sweet Potatoes, Southern Cooperative Series Bulletin No. 3, December 1945.

Sweet Potato Recipes, U. S. Department of Agriculture Bulletin AIS-53, October 1946.

Sweet Potato Recipes, War Food Administration, Office of Distribution.

Taylorville Presbyterian Church, The Taylorville Cookbook, 1939.

Mary E. Thomas and S. Virginia Wilson, Sweet Potatoes - How to Use Them, N. C. Extension Service Misc. Pamphlet No. 79, October 1944.

L. M. Ware, Nature of Alayam Products, Alabama Agr. Exp. Station Circular, December 1946.

J. G. Woodroof and Ida S. Atkinson, Preserving Sweet Potatoes by Freezing, Georgia Experiment Station Bul. No. 232, March 1944.

### C. Other Sources

Clara M. Brown, Food Score Cards, University of Minn. Press, 1937.

W. W. Chichester, Marietta, Georgia, Personal Communication on the subject of Sweet Potato Chips.

Alice M. Child and Kathryn B. Niles, Food Preparation Recipes, New York, John Wiley and Sons, Inc.

Personal conversations with numerous persons in North Carolina.

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